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GEOPHYSICAL VARIABLES AND HUMAN BEHAVIOR: XV. TECTONIC STRAIN LUMINOSITIES (UFO REPORTS) AS PREDICTABLE BUT HIDDEN EVENTS WITHIN PRE-1947 CENTRAL U.S.A.

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Summary.—Changes in tectonic strain within the earth's crust have been hypothesized to be the primary energetic source for most documented UFO (unidentified flying object) events. Multiple regression analyses indicate that at least 50% of the variance in UFO report measures can be accommodated by optimal solar-seismic variables. Equations for the central U.S.A. accurately predicted the occurrence of UFO-report episodes after the years from which they were generated and indicate the occurrence of UFO-like reports long before the year 1947. However the labels applied to these phenomena may have changed from generation to generation.

Recent analyses (Persinger, 1983a) suggest that events labelled as "luminosities" in previous centuries are usually called UFOs (unidentified flying objects), or some variant descriptor, now. This conclusion was based upon the accurate prediction of contemporary UFO report (UFOR) years in Europe on the bases of discriminant functions generated from nineteenth century data. Variables selected for these functions were determined by the hypothesis that *most* UFO-like reports have been and still are associated with tectonic strain within the earth's crust (Persinger, 1976, 1983b).

This article displays further evidence that UFORs may represent actual events generated by changes in tectonic strain. Since it has been a persistent feature of crustal dynamics, UFOR data from today should be able to "predict" UFO-like reports in the past. Once sampling artifacts are attenuated, the relationship should be evident for any area of the earth's surface. For analyses involving 6-mo. increments (as cases), two empirical assumptions of the hypothesis are: (1) tectonic strain is reflected by the temporal patterns of earthquake intensities during increments before (and after) the occurrence of UFORs and (2) consequences (e.g., geomagnetic storms) from *sudden* changes in solar activity act as "triggers" to evoke the luminous events if optimal strain is present (Persinger, 1983c, 1983d).

METHOD

UFORs collected from the CUFOS (Center for UFO Studies) were

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obtained by magnetic tape for the central U.S.A. for 6-mo. intervals (January-June, July-December) for the years 1950 to 1975 (end of data file). Two measures were derived: the square root of the total number of UFORs and a 0, 1, or 2 flap score based upon the rate of change in numbers of UFORs and the absolute value of change. The latter measure was selected to avoid the skewness in the numbers of UFORs and to attenuate the effects of absolute number shifts from changing data sources (sampling procedures).

A "flap" was defined as a sharp increase in the number of UFORs during an approximately 1- to 3-mo. period within an area approximately 500 by 500 km. For this measure, a 0 indicated no flap (although there may have been a continuous low-level input of UFORs), 1 indicated a normal flap, and 2 indicated an exceptional flap (of which there have been only about 5 or 6 between 1950 and 1975). The flap measure correlated 0.80 with a major episode (flap) measure from *Fate Magazine* (primarily equivalent to Type IV to Type VI from CUFOS) and 0.80 with the flap measures from APRO (Aerial Phenomena Research Organization).

Since UFORs in this study involved ordinal (0, 1, 2) and interval (numbers of reports) measures, stepwise multiple regressions (REGRESSION) were completed by SPSS software on a Dec 2020 System computer. For this study, *only* those earthquake (for the central U.S.A.) and solar-geophysical measures that were available for the nineteenth century were used as independent variables; they were lagged from 1 to 10 increments (5 yr.). The most significant and persistent variables (or their lags) were: the mean square root of the monthly Zurich sunspot numbers per 6-mo. interval (SUNSQ), the maximum positive increase in monthly sunspot numbers between any two adjacent months (PSBURST) during a 6-mo. interval (this was selected since modern geomagnetic measures were not available for the nineteenth century), the percentage change (truncated at 300%) in low intensity (III, IV, and V Modified Mercalli) quakes from the previous interval (LOWCH), and the occurrence of intensity VII or greater quakes (QVII). LOWCH was selected (as well) because it involved *relative* changes and would be less influenced by baseline drifts in the absolute numbers of detectable seismic events over decades.

Two important computations were made. First, the most optimal transformation of the change in sunspot numbers involved recoding the maximum positive change in sunspot numbers between any two adjacent months within each 6-mo. interval to an ordinal (implicitly interval) scale where any change less than $40 = 0$, $41 - 50 = 1$, $51 - 60 = 2$, etc. with a maximum of 7. This measure (SPJUMP) was correlated (0.40 to 0.60) with various transformations of the standard deviation (ASD) in the monthly average A_p indices of geomagnetic activity for each 6-mo. interval and was easily replaced

by ASD in the equations for predicting contemporary periods. Second, although there were no quakes with intensities above VII within the central U.S.A. between 1950 and 1980, historical data indicated the occurrence of VIII or greater events and in some instances multiple VIIs within the same increment. Consequently, a weighted measure was used for this variable whereby VIII = 2, VII quakes, IX = 3, VII quakes and X = 4, VII quakes.

RESULTS

Predictions of the numbers (expressed as total and not square root values) of CUFOS-type reports from equations generated by solar-seismic variables for the years 1950-1969 (CUFS69) are shown in Fig. 1. Expected

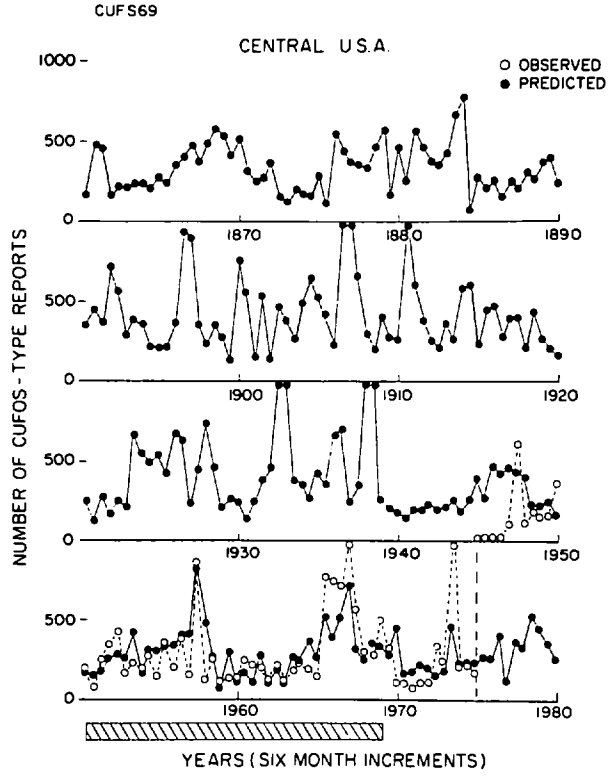

FIG. 1. Observed (O) and predicted (●) CUFOS-registered numbers of UFO reports for 6-mo. intervals within the central U.S.A. according to equation CUFS69. The shaded bar indicates the years (1951-1969) from which the equation was generated. Predicted values for numbers of UFO reports before and after this period are also shown.

values for the flap scores (CFLA69J) are shown in Fig. 2. Specific details for these equations, as well as one that included the minimum number of variables (CFL69S) and still demonstrated almost identical prediction capaci-

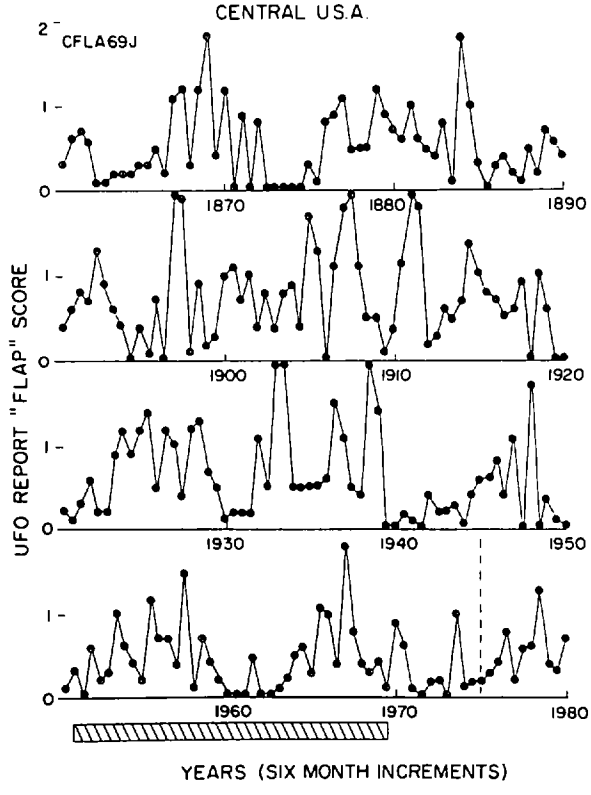

FIG. 2. Predicted UFO report flap scores for 6-mo. intervals between the years 1860 and 1980 within the central U.S.A. according to equation CFLA69J. The shaded bar indicates the years from which the equation was generated.

ties, are described in Table 1. The optimal equation (CUF74J) that included years 1950 to 1974 did not predict values any more effectively than the ones that ended with 1969. As can be seen, the predicted general pattern and peak report numbers are commensurate with the observed data.

In general, for the years 1950 to 1969, CUFOS-registered UFORs increased if: (1) there was a decrease in the mean of the sunspot measures 5 lags before, (2) a VII or greater quake 3 lags before, (3) a percentage increase of low intensity quake numbers during the previous six months (unless both

TABLE 1

TYPICAL EQUATIONS FOR TOTAL NUMBER OF CUFOS-REGISTERED UFO REPORTS (CUFS69 AND CUF74J) AND FLAP SCORE VALUES (CFL69S AND CFLA69J)

	CUFS69	CUF74J	CFL69S	CFLA69J
X_1	SUNSQ5	SUNSQ5	SUNSQ5	SUNSQ5
B(S.E.B.)	−0.68	−0.82	−0.068	−0.062
	(0.23)	(0.22)	(0.02)	(0.02)
X_2	LOWCH8	LOWCH1	LOWCH1	LOWCH1
B(S.E.B.)	−0.019	0.018	0.0018	−0.0019
	(0.008)	(0.007)	(0.0009)	(0.0009)
X_3	Q7M3	LOWCH8	Q7M3	SPJUMP
B(S.E.B.)	5.46	−0.016	0.68	0.20
	(2.73)	(0.007)	(0.30)	(0.07)
X_4	Q7M2	SPJUMP	PSBURST	Q7M3
B(S.E.B.)	5.12	1.59	0.011	0.80
	(2.59)	(0.68)	(0.005)	(0.30)
X_5	LOWCH1	SPJUMP1	PSBURST1	SPJUMP1
B(S.E.B.)	0.014	−1.28	−0.010	−0.15
	(0.008)	(0.67)	(0.005)	(0.07)
X_6	PSBURST	Q7M3		Q7M4
B(S.E.B.)	0.059	3.96		0.45
	(0.04)	(2.42)		(0.28)
K	19.78	22.7	0.83	0.71
MR	0.69	0.68	0.66	0.71
ARS	0.38	0.39	0.35	0.41
$M + SD$	17.0 ± 6.2	16.5 ± 6.2	0.42 ± 0.68	0.42 ± 0.68
SEE	4.92	4.87	0.54	0.52
MIC	0.31	0.20	0.39	0.25
D-W	1.41	1.20	1.70	1.50
F	4.80	6.25	5.01	5.32
df	6,31	6,43	5,32	6,31

Note.—The various symbols indicated: B (partial regression coefficient), S.E.B. (standard error of B), K (constant for the equation), MR (multiple R value), ARS (adjusted R value), M (mean of the numbers or score), SEE (standard error of the estimate for the equation), MIC (maximum intercorrelation between variables [X_1 . . X_2, etc.] in the equations), D-W (Durbin-Watson test), F (F value), and df (degrees of freedom).

lags 3 and 4 of QVII entered the equation), (4) a sudden increase (especially above 40) in sunspot numbers between any two succesive months during the contemporary interval, and (5) a decrease in this measure during the previous interval. The Durbin-Watson tests deviated noticeably from 2.00, suggesting an autocorrelation within the data. Although this may reduce the significance of the F ratios *per se*, it does not necessarily change the predictive capacity of the equations.

Fine tuning of the equations for the years 1950 to 1969 by using all

combinations of the actual numbers of quake intensities (III or less, IV, V, VI, and VII) and by introducing measures of geomagnetic averages and variations elevated MRs to not more than 0.85 with seven variables (and shifted the Durbin-Watson values to between 1.90 and 2.10). Although this suggests that only about 65% of the variance in numbers of UFORs can be accommodated, there are at least three possible explanations for this asymptote. First, it may reflect the overinclusive nature of the label and the failure to discriminate investigated versus non-investigated cases (Hendry, 1978). Second, the intercorrelation of about 0.75 between 6-mo. flap scores between three data sources suggests the contribution from other sources of variance (perhaps factor scores would be more appropriate in future studies). Third, there are inconsistent rates of change in strain over time; a procedure using fixed interval of analyses may not be optimal. Of course, a fourth option is that some UFORs and types of UFORs may be related to sources of variance minimally correlated with tectonic strain.

Despite these limitations, the equations predicted increased numbers of UFORs or elevated flap scores for years *not* involved with the generation of the equations (Figs. 1 and 2). Following an unusual paucity of UFORs between 1939 and 1945, a cascading elevation of reports was predicted for the years 1946 to 1948. The peak of this increase was coincident with the 1947 (summer) "UFO panic." Both equations generated from years before 1970 accurately predicted the occurrence (but not the magnitude) of the flap during the second half (October) of 1973. Two other UFOR bursts during the second parts of 1976 and 1978 were specified by the equations but confirmation (or refutation) data are not available at this time.

The equations also predicted that there *should* have been UFO-like conditions, some even larger than contemporary episodes, long before the year 1947, the date considered by many popular researchers to be the onset of the phenomena. As emphasized by J. A. Hynek (personal communication), there were very few UFORs before this date, yet tectonic strain has been a persistent feature of the earth's crust. If tectonic strain accommodates a large portion of the UFOR variance, then there should have been copious reports within this area specifically and throughout human history in general.

One likely explanation is that luminosities *were* persistent and frequent phenomena, but recognition has been masked by use of different labels or luminosities were not reported because no social networks existed to record them (Westrum, 1982). Some phenomena, such as child battering, may be historically persistent but simply not reported because of social mores. Other phenomena may not fit into contemporary methodological or theoretical frameworks and hence be ignored. The existence of meteorites and ball lightning are only two recent examples (Westrum, 1978).

In addition, the labels used to describe unusual or infrequent events not only change from generation to generation but determine the characteristics of the reporting. It would be difficult to discern the persistent occurrence of Halley's comet (if it were not for its periodicity) solely from the medieval descriptions of "the sword of God dripping crimson with the blood of sinners." Considering the persistent religious themes that dominated pre-twentieth century culture, one expects that most luminosity reports (especially close encounter episodes) would have been interpreted within biblical (and personal) contexts, as were many more routine natural phenomena such as unusual meteor showers and even earthquakes.

According to the equations, there should have been large numbers of UFO-like reports between the years 1880-1884 and during the first part of 1897. Interestingly, the first period coincided with numerous luminosity reports in the central U.S.A. while the 1897 high coincided with the well-documented "airship invasion" that was reported freely in the central-eastern U.S.A. during April, 1897 (Jacobs, 1975). During the latter period, the Zeitgeist was dominated by aspirations to build "flying machines" and by an anticipated invasion from Cuba. Not surprisingly, the odd lights were reported as unusual airships; their inhabitants spoke "Spanish."

Although the 1906 and 1910-11 maxima contain historical referents, the occurrence of luminosities during the 1920s and 1930s have not been mentioned in the traditional UFO literature. Keel (1970) has noted the epidemics of so-called "mysterious airplane" reports of these years but there are no specific data to support the predicted extraordinary flaps during the year 1933 and the second part of 1938. On the other hand, no one has investigated these years in detail and with this perspective. One would expect that brief (a few months), intense UFO episodes would be more evident in the contemporary news coverage than maintained baseline shifts of one or two years duration. Human beings habituate to even the most bizarre phenomenon if it is presented too frequently.

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